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RADIOACTIVE TUMBLEWEEDS IN THE 100 AREAS

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RADIOACTIVE TUMBLEWEEDS IN THE 100 AREASINTRODUCTION

On July 25, 1973, Reactor Plant Services reported that radioactive tumbleweeds were observed growing in 100-B, -D, and -F Area burial grounds. The purpose of this document is to report the extent and nature of the radioactivity observed, short-term corrective actions taken, possible longer-term corrective methods, and a recommended course of action for selecting a final, long-term weed abatement program.

BACKGROUND

Terminated 100-Area burial grounds are surveyed for radiological status annually in accordance with DUN-7805, Rev. 1.¹ During the CY-1973 survey, groups of radioactive tumbleweeds were located in 100-B, -D, and -F Area burial grounds. The number of radioactive tumbleweeds varied from several small plants in the D-Area burial ground to numerous small and mature plants in the F-Area burial ground. Radioactive tumbleweeds had not been observed on any previous burial ground survey.

Samples of the weeds were collected for laboratory analysis to determine the type and location of the radioactive contamination. All other deactivated and terminated facilities in the 100 Areas were then surveyed to determine if radioactive tumbleweeds were growing in any of these facilities. The only other location in which contaminated weeds were observed was 107-DR.

During the course of the radiation surveys, tumbleweeds reading up to 10,000 c/m (EGM with P-11 probe) were observed.

ANALYTICAL RESULTS

Samples of the soil in the immediate vicinity of the radioactive tumbleweeds were taken and counted. Results indicated that the soil was not contaminated. In addition, the surface of the tumbleweed stalks and leaves were smeared lightly with Gelman Glass Fiber filter papers. Results indicated that no smearable contamination existed on the surface of the plants; therefore, internal contamination was assumed to be the source of all radiation observed and that the internal contamination resulted from material found only in sub-surface soils.

1. DUN-7805, Rev. 1, "Status of 100-Area Deactivated Facilities and Surveillance Program Schedule," J. T. Baker, 3/26/73.

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Samples were taken from radioactive tumbleweeds found in 100-B, -D, and -F Area for radionuclide analysis. Results are presented below.

	<u>Cs-137</u> <u>%</u>	<u>Zn-65</u> <u>%</u>	<u>Co-60</u> <u>%</u>
100-B	31	55	14
100-D (1)	14	51	35
100-D (2)	10	39	51
100-F	85	ND	15

ND - Not Detectable

A mature radioactive plant, approximately 16 inches in height, was removed with 10 inches of root from the 100-F Area burial ground. Sections of the leaves, stems, and root were counted to determine location of maximum deposition. Results are presented below.

<u>Location</u>	<u>Specific Activity</u> <u>(nCi/g)</u>
Root	11
Stem near central stalk	46
Leaves	60

Before the plant was removed for analysis, a reading of 10,000 c/m was obtained with an EGM equipped with a P-11 probe.

IMMEDIATE CORRECTIVE ACTIONS TAKEN

Radioactive tumbleweeds represent a source of uncontrolled radioactivity in terminated and deactivated burial sites and facilities; therefore, the growth and spread of these plants must be controlled. After the extent and nature of the radioactive tumbleweed problem was established by complete radiation surveys, all contaminated plants were removed individually by hand from the burial grounds, placed in standard radioactive waste cartons, and buried in the active 100-D Area burial ground. Fifty man days of effort by Reactor Plant Services personnel were required to complete the surveys and removal.

Burial of the plants was selected as the disposal method rather than burning for two reasons: (1) the plants were green and would not burn well; and (2) plant ash would have to be removed from the terminated burial grounds to prevent contamination of the soil surface.

The terminated burial ground survey frequency is being increased to every other month during the period from May 1 to November 1.

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POSSIBLE LONG-TERM CORRECTIVE METHODS

A weed abatement program that is effective over a long period of time is required for 100 Area burial grounds and contaminated facilities. The program should meet the following criteria:

1. 100 percent effective - prevent growth of any tumble-weeds or other plants that could assimilate buried radioactive material.
2. Durability - withstand normal weather conditions, light animal and human traffic, while satisfying criterion 1, with minor maintenance.
3. Cost - low initial and operating cost.

Several weed abatement methods have been used by ARHCO. These methods include plastic ground covers, herbicides, and establishment of grass covers. Unfortunately, none of these has yet been selected as a satisfactory long-term weed abatement method.²

In order to more effectively evaluate the available abatement methods, K. R. Price of BNW Terrestrial Ecology was consulted for assistance. After review of the available data and inspection of a typical terminated 100 Area burial ground, the following possible weed abatement methods were listed:

1. Plastic ground covering
2. Herbicides
3. Soil Sterilants
4. Hydrophobic Agents
5. Concrete Slab
6. Cheatgrass Cover

ARH-2164, "Preliminary Problem Definition - Decommissioning the Hanford Site," recommends that 100 Area burial grounds be stabilized using Method 5, concrete slabs.³ Approximately 62 acres of burial grounds would have to be so treated,⁴ at an estimated total cost of \$4,000,000 (calculated by extrapolating data for 100-H and 100-F Areas presented in Reference 5.) Both

2. Personal conversation, H. L. Maxfield, 8/16/73.
3. ARH-2164, "Preliminary Problem Definition - Decommissioning the Hanford Site," 4/72.
4. DUN-8133, "1972 Environmental Releases," T. E. Dabrowski, 3/12/73.
5. Letter, N. R. Miller to O. J. Elgert, "Updating of Hanford Radioactive Waste Management Plans - PWM-530," dated 5/21/73.

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Methods 1 and 2 are being tested and evaluated by ARHCO in the 200 Areas; however, neither method appears to satisfy all performance criteria adequately. Methods 3 and 6 are attractive, although a cheatgrass cover has not yet been established and evaluated as a burial ground stabilizer or a weed abatement method. Plans to decommission the 100 Areas necessitate that the weed abatement method either also act as a burial ground stabilizer or be compatible with the stabilization method.

RECOMMENDED COURSE OF ACTION

Review of the characteristics and preparatory requirements for each abatement method reveals that soil sterilants, concrete slabs, and cheatgrass cover are the three most attractive methods. However, the final burial ground stabilization method, concrete slabs, recommended in ARH-2164, precludes the use of a cheatgrass cover as a weed abatement method. The most convenient, effective, and least costly abatement method then remaining for the period until concrete slabs are installed over the burial grounds is the soil sterilant.

It is recommended, therefore, that a soil sterilant be applied to all 100-Area deactivated and terminated burial grounds and 107 retention basins (with dirt fill) no later than November 1 of this year. A program of repeated applications should be initiated as required by new weed growth in subsequent years.

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